

WHAT IS CLAIMED IS:

1. A cooling apparatus for usage in an electronic system comprising:
a liquid loop heat exchanger body configured for attachment to an exterior surface
of an electronic system chassis.
2. The apparatus according to Claim 1 further comprising:
a tube segment capable of enclosing a cooling fluid and positioned interior to the
heat exchanger body; and
a plurality of fins configured in a stack of closely-spaced plates attached to the
tube segment.
3. The apparatus according to Claim 1 wherein:
the heat exchanger body is adapted for mounting on an exterior surface of a
compact computer server chassis and has physical dimensions that are
larger than can be contained within the chassis.
4. The apparatus according to Claim 1 wherein:
the heat exchanger body is adapted for mounting on a frontal exterior surface of a
chassis.
5. The apparatus according to Claim 1 further comprising:
a tube capable of enclosing a cooling fluid and extending in a loop that passes
interiorly through the heat exchanger body external to the electronic system
chassis and passes to cooling plates coupled to electronic components
interior to the electronic system chassis.
6. The apparatus according to Claim 1 further comprising:
a tube segment capable of enclosing a cooling fluid and positioned interior to the
heat exchanger body; and
a plurality of fins configured in an ornamental arrangement attached to the tube
segment at a frontal surface of the electronic system chassis.

7. The apparatus according to Claim 1 wherein:
the heat exchanger body is variable in width and height along a surface of the electronic system chassis to accommodate indicator lights, access to removable input/output devices, and/or labeling.
8. The apparatus according to Claim 1 further comprising:
an inlet tube and an outlet tube coupled to the heat exchanger body; and
hinges coupled to at least one of the inlet tube and outlet tube enabling the heat exchanger body to be rotated away from the electronic system chassis for user and/or service access.
9. The apparatus according to Claim 1 further comprising:
a pump coupled into the tubing and capable of generating a pressure head suitable to drive a cooling fluid interior to the tubing through the loop interior and exterior to the chassis.
10. A liquid loop cooling system comprising:
a tubing forming a loop that extends through an electronic system chassis interior to selectively apply cooling to interior system components and further exits the chassis to an exterior tubing segment exterior to the chassis; and
a liquid loop heat exchanger exterior to the chassis and coupled to the exterior tubing segment.
11. The cooling system according to Claim 10 further comprising:
a pump coupled into the tubing and capable of generating a pressure head suitable to drive a cooling fluid interior to the tubing through the loop interior and exterior to the chassis.
12. The cooling system according to Claim 10 further comprising:
at least one cold plate coupled to the tubing positioned to locally cool a heat source.
13. The cooling system according to Claim 10 further comprising:

an inlet tube and an outlet tube coupled to the heat exchanger; and
hinges coupled to the inlet tube and outlet tube enabling the heat exchanger to be
rotated away from the electronic system chassis for user and/or service
access.

14. An electronic system comprising:
a chassis including airflow inlet and outlet vents, and fans capable of circulating
air from the inlet vents to the outlet vents;
a plurality of components mounted within the chassis and forming local heat
sources;
a tubing forming a loop that extends through the chassis interior to selectively
apply cooling to the components and further exits the chassis to an exterior
tubing segment exterior to the chassis; and
a liquid loop heat exchanger exterior to the chassis and coupled to the exterior
tubing segment.

15. The system according to Claim 14 further comprising:
a pump coupled to the tubing and capable of pumping a cooling fluid through the
tubing.

16. The system according to Claim 14 further comprising:
at least one cold plate coupled to the tubing and selectively positioned to cool the
local heat sources.

17. The system according to Claim 14 further comprising:
at least one fan selectively positioned to drive air through the heat exchanger.

18. The system according to Claim 14 further comprising:
at least one fan selectively positioned within the chassis.

19. The system according to Claim 14 further comprising:
at least one fan coupled to the heat exchanger external to the chassis.

20. The system according to Claim 14 wherein:

the heat exchanger is adapted for mounting on an exterior surface of a compact form factor computer server chassis and has physical dimensions that are larger than can be contained within the chassis.

21. A method of configuring a liquid loop cooling system in an electronic system comprising:

arranging a tubing in a loop extending through an electronic system chassis interior;
extending the tubing loop outside the electronic system chassis;
mounting a liquid loop heat exchanger on the exterior of the chassis; and
connecting the tubing loop exterior to the chassis to a liquid loop heat exchanger.

22. The method according to Claim 21 further comprising:
determining heat distribution within the electronic system chassis containing a plurality of components; and
arranging a tubing in a loop extending through an electronic system chassis interior to selectively apply cooling to heat-generating components.

23. The method according to Claim 21 further comprising:
coupling the tubing interior to the chassis to at least one cold plate selectively positioned to cool the heat-generating components.

24. The method according to Claim 23 further comprising:
positioning at least one fan to drive air through the liquid loop heat exchanger, the at least one fan be positioned interior to the chassis, exterior to the chassis, or a combination of interior and exterior to the chassis.

25. The method according to Claim 23 further comprising:
inserting a pump in the tubing loop to enable pumping of a cooling fluid through the tubing and the heat exchanger.